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DEVELOPING CONTEXT SPECIFIC PROCESSES TO IDENTIFY & MENTOR GIFTED CHILDREN IN INDIA

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ABSTRACT

India is investing expertise and efforts to bring significant education reforms. Raising the standards of education is one of the top most priorities at the highest level. Education of high ability learners is also one of the concern areas. It has been now realized to evolve indigenous methods to identify and nurture gifted children. The present research is an empirical study. It aimed to develop process of identifying and nurture gifted children in Science and Mathematics. The aims of the research were three fold. The first was to conceptualize giftedness in Indian context. The second aim was to develop detailed methodology and appropriate instruments to identify children with gifted traits. The third aim was to setup mentoring program for the identified group of students. The study developed detailed methodology to identify and mentor potentially gifted children.

KEYWORDS: giftedness, gifted behavior, mentoring.

1. Introduction

Providing access to knowledge is the most fundamental way of increasing the opportunities and reach of individuals and groups. Therefore, means must exist for individuals who have the ability to receive and comprehend knowledge (National Knowledge Commission)[1]

There is considerable concern at the highest level in India to enhance general education and in particular to advocate support for the most able students. These children, if nurtured properly can be significant contributors to the knowledge society, as envisioned by the National Knowledge Commission. National Knowledge Commission further emphasized the need to retain, promote and attract talent in Science and Mathematics. The Commission considered it imperative to evolve systematic and innovative approaches to promote disposition and appreciation for Science and Mathematics among potential learners at school level.

Very few systematic researches have been done in India to understand the needs of gifted children. A National level pilot project was initiated by the Office of Principal Scientific Advisor (PSA) to the Government of India in 2010 to develop battery of tools to identify gifted children from the vast socio-culture diversity of the country. It was therefore decided to start with three pilot projects in three different parts of the country, under the National Level Project on Gifted Children in India, commissioned by the PSA Office. Three projects were carried out in Delhi (Northern India), Bangalore (Southern India) and Karnataka and Andhra Pradesh (Southern India limited to rural/disadvantaged children) The present paper presents the research work carried out in northern India, mainly in the capital city, Delhi and the research work was further extended to Kanpur, a district around 470 km away from Delhi.

2. Methodology and Analysis

The project started with exhaustive brainstorming meetings with experts in the field of education, child psychology, sociology, mathematics, science and with school administers to address some of the essential questions which were fundamental in setting up the agenda:

- How do we define/operationalize the term, "Gifted" suited for Indian population?
- What criteria shall we adopt to identify a gifted child?
- What kind of instruments shall we plan to identify a gifted child?
- What shall be the right age/grade to identify a gifted child?
- Do we need a homogenous scheme of Identification at National level or do we need a heterogeneous model of identification at local level to minimize the imbalance in educational opportunities?
- What kind of educational experiences shall we provide to the identified group of students?

Grounded in the Three Tier Model of Identification (fig 1.1) of Gifted Children in India and supported by thorough review of research practices and identification theories, a comprehensive framework was developed which served as the scheme of identification. The framework was developed to address the issues of excellence, equality and diversity peculiar to Indian context.

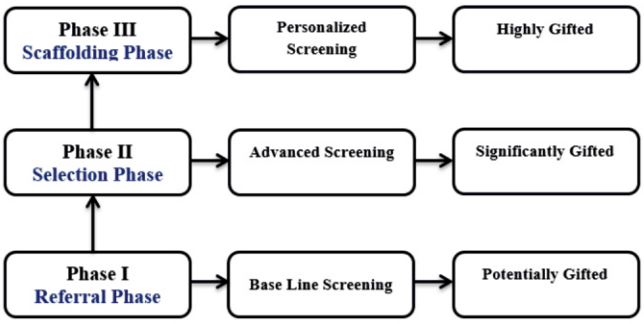

fig 1.1Three -tier model (Sharma,2012)

The conceptual framework to identify gifted children for the present research work was based on the following notions highlighted and accepted by almost all significant researches in the field of giftedness (Renzulli, 1978; Tanenbaum, 1996; Winner 1996; Gardner 1983; Stenberg, 1988; Howe, 1999; Scarr, 1996; Eyre, 2001)

- Giftedness is developmental which can be foster and nurtured
- Giftedness cannot be expressed as a combination of certain ingredients or traits. It is rather manifestation of potentials in unique behaviors such as actions, expressions or thought process which can be observed
- There can be no fixed indicator or landmark to measure potentials or gifts
- Identification of giftedness is a process and not a one- time measure

- Although giftedness is a universal phenomenon, it can be properly understood when it is contextualized

- Any program to identify gifted children cannot be developed or imposed in isolation from other influential factors. It has to be in synchronization with the native cultural of the target group and society (Maitra and Sharma, 2009; Shaughnessy 2006)

Gifted traits thus can be best described as 'gifted behaviors which are expressed through actions/behaviors /thought process and expressions in appropriately challenging learning situation'. Hence, the onus of identification of gifted behaviors lies with the teachers, parents and adult community by challenging the unique potentials of individuals and keeping the spark alive.

The accepted wisdoms on giftedness gave necessary direction to plan the identification process in an explorative manner. The below (fig 1.2) is the schematic representation of the conceptual framework:

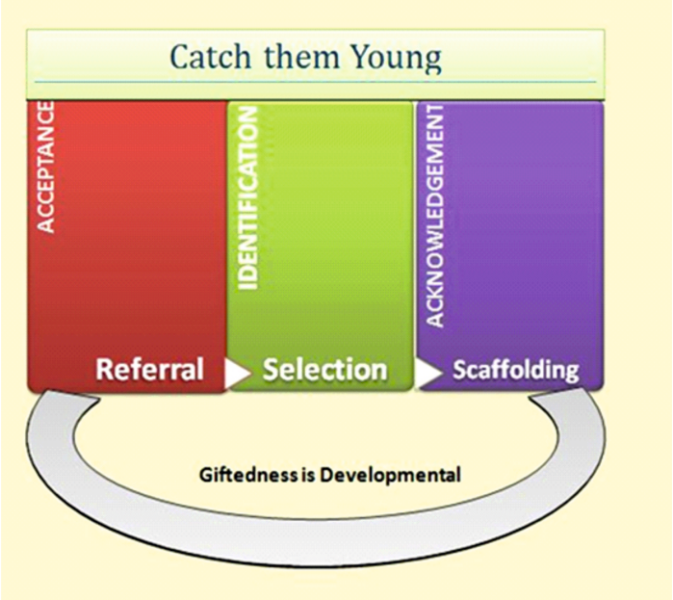

fig 1.2: Conceptual Framework of Giftedness in Academic Domain

Broad definition of Giftedness as per the framework is, 'Giftedness is untapped, inherent, heightened potential in one or more than one cognitive domain which can be demonstrated as manifestation of learning behaviors only under favorable conditions such as Acceptance, Acknowledgement and Nurturance'.

Acceptance: We accept that there are individuals among us who are gifted

Acknowledgment: We believe in their potentials and allow them to think differently

Nurturance: We provide them with right opportunities, appropriate scaffolding and proper mentoring to transform their potentials into geniuses.

The three key words in the framework, Acceptance, Identification and Acknowledgement are based on the following three premises:

- There are students with outstanding potentials and exceptional abilities in all socio-cultural groups across India.

The strength of children in India lies in their closeness to the rich geographical and cultural diversity which stimulates their natural talent. No single identification tool can sufficiently capture the heterogeneity of students' understanding of their natural environment. Also, there exists huge disparity of educational opportunities available to children in formal and informal education set up. It is extremely difficult to control or minimize the effect of exposure to learning opportunities. No single tool can best estimate the potentials of children exposed to significantly diverse learning environment.

- A promising young mind needs both greater care and adequate stimulation.

Potentials can be manifested in observable gifted behaviors only when children with promises are provided with appropriately challenged contexts.

- One of the most valuable rewards, a potential student can have is the exposure to a mentor.

Since gifted traits are developmental and can grow only when fostered with appropriate scaffolding. Therefore, children with potentials shall be served with nurturance program under the care of a suitable mentor who not only facilitates the unique strengths of the child but also provides emotional scaffolding.

Therefore, it was decided to develop an identification process in congruence with mentoring support.

The project aimed to achieve following objectives:

- To evolve base line identification procedure to prepare a talent pool of potentially gifted children

- To identify significantly gifted children who were remarkably superior in science and math , by constructing an identification matrix to accommodate multiple combinations of different traits of potentially gifted children

- To recognize exceptionally gifted children in science and mathematics using more in-depth and flexible range of identification criteria

- To develop mentoring support network for the identified group of children

2.1 Preparing the ground:

Once the conceptual framework was designed, it was decided to identify schools that were willing to participate in the research.

A survey of schools was done to identify different kinds of schools. After a detailed survey and finding out the willingness of schools, thirty seven schools in Delhi were selected. The sample schools consisted of a diverse cohort of public schools, private schools, government aided schools, minority schools, 'PratibhaVikas' schools (state level public schools for talented children) and 'Jawahar Navodya Vidayala' (National level public schools for talented children). The selection of school was done to get wide cross-section across schools.

The age group was another important consideration in selecting the sample. Children enrolled in formal school system and presently studying in grade V (9+yrs) to grade VIII (13+ yrs.) were chosen for the project. The selection range was based on following age related facts:

- As by the noted stages of cognitive development by Jean Piaget, Children in this age group were cognitively prepared to construct abstract mathematical concepts, to extend already learned concepts to new situations and were ready to understand mathematics as a discipline.

- They were curious and observant to scientific phenomenon around them and were able to understand and appreciate scientific perspective of their immediate environment.

- They were ready to raise questions and formulate logical arguments as their thoughts were organized by now and they were better equipped with language/vocabulary to articulate their curiosity and argue their point of view.

The process to identify potentially gifted students consisted of multilayered procedure based on both test and non-test criteria engaged in four phases. It acknowledged students who scored high on traditional achievement tests but also included students who could connect with science and mathematics more effortlessly. The entire range of assessment and identification process has been summed up as “Developmental Identification and Mentoring Package” (DIMP).

Foundation Principles of DIMP:

- Identification of gifted children is a process
- Identification process has to be multi-pronged
- Immediate context of the child shall be at the center of any kind of identification activity
- Identification and Mentoring shall go hand in hand (fig 1.3)
- Mentoring is next stage of identification
- As the level of mentoring become more focused and intensive, so is the identification
- Identification provides direction for mentoring
- Mentoring validates the identification results

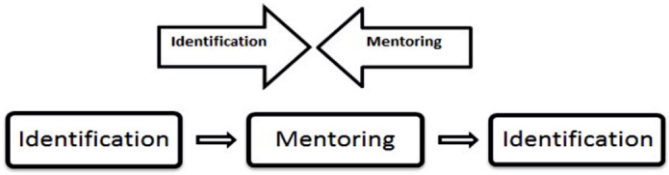

fig 1.3 Identification-Mentoring Relation

The sequence of identification process through four phases of identification is described below:

Table 1.1 Gifted Identification Process

Phase	Methodology	Outcome
Referral Stage	Observations and Nominations	Talent Pool of Potential Students
Selection Stage	Science and Mathematics Ability Test	Group of Significantly Promising Students
Scaffolding Stage	Mentoring and Guidance	Highly Gifted Students
Evolving Stage	Highly Advanced Personalized Mentoring	Exceptionally Gifted Students

The process aimed to look into the academic world of the child, such as, how a child felt when encountered with unusal problems, how enthustically he/she wanted to take the challenge, how effectively a child could demonstrate subject leadership and many others. Intially reserach team spent around one week in each school to observe children in classrom and out of classroom setting to list probable learning behaviours demonstrated by students and further categorized those behaviours which were strikley different and challenging. Reserachers made detailed check-list of learnring behaviours and also wrote on-field records to identify significantly advanced behaviours as indicators of potential gifted behaviours.

2.1.1 Preparation and Analysis of Referral Stage:

Referral stage was aimed to prepare a talent pool of potentially gifted children who demonstrate significant learning behaviors in everyday learning environment. The objective was to bring students in the talent pool just by observing their natural traits and without putting them under undue pressure. Since, the prime focus was to locate subject specific gifted behaviors; it was decided to actively engage subject teachers in the process of preparing talent pool. Teachers are the strongest and closest link between educational opportunities and the students. Also, they are the most -close observer of the development processes that take place in children. Since, gifted behaviors appear like sparks and rarely follow consistent path, teachers can be the most reliable witness of any such behavior demonstrated by the child. Though learning is a continuous process that takes place in an individual all the time, it is important to look for clues that allow us to assess cognitive capacity of learners.

Therefore, it was decided to orient teachers on how to look for right clues and indicators to identify learning behaviors of potentially gifted children in the learning setting. Teachers were oriented and sensitized to be more vigilant and prompt to catch the sparks demonstrated by gifted children in school environment.

Teachers were also encouraged to promote the culture of dialogue, sharing, questioning and investigation so that potential gifted behaviors become more evident. Once, teachers were thoroughly oriented to look for various clues demonstrated by students in their classes, they became responsible partners in the process of identification.

An exhaustive identification tool, Gifted Children Nomination Scale for Teachers (GBRS-T) was prepared for teachers. It was a rating scale and teachers were asked to nominate students on the basis of traits listed in the GCNS-T based on their continuous assessment throughout the classroom interactions over a period of time. The entire exercise was linked with existing assessment practices in schools. The only important extension to this practice was to encourage teachers to bring children in the classroom discourses by changing their pedagogy and classroom environment so that out of box thinking, deep and probing questions and different intuitive ideas could be promoted in the class.

Not only the teachers, students themselves and their peers were also asked to nominate. Detailed questionnaires were prepared where students and their peers were asked questions about their classroom experiences of peer-learning, peer acceptance and peer-pressure. A detailed questionnaire, 'Gifted Behavior Nomination Survey for Students (GBNS-S) was prepared where students were asked to reflect on their learning experiences with their peers.

An open–ended questionnaire 'I and Mathematics/Science' was prepared where students were asked to spend some time and reflect on their reflect relation with the subjects, science and mathematics.

Thus, Referral Phase constituted a battery of nominations by important contributors in the child' academic life. Though, the family and parents were considered one of the most significant contributors in the child' world but their experiences were not incorporated at this stage mainly because of two reasons: firstly, the sample group was very large, around 30,660students, it was not possible to meet parents of all children. Secondly, without orienting the parents about the right understanding of gifted behaviors, it was difficult to get correct indicators from them.

Three-point Index was developed to create a talent pool of potentially gifted children based on various nominations:

- Achievement index (AI)
- Nomination Index (NI)
- Self expression index (SEI)

Achievement Index was calculted for the each child on the basis of past two years achievement in Science and Mathematics plus any special special achievement in Science and Mathematics

$$Achivement\ Index\ (AI) = \frac{(S1 + S2 + S3) \times 100}{Maximum\ Score}$$

S1 & S2= past two years scores/grade

S3=special achievement

Nomination Index (NI) was calculated on the basis teachers' nomination, peer nomination and special nomination.

Nomination Index (NI):

- Teachers' nomination on GBRS-T

$$TI = \sum_{i=1}^{20} \frac{(ti \times si)}{Total\ Score} \times 100$$

where ti=number of triat in the check list

si=rating score given by the teacher to each triat

Total score = 4 × 20

- Teachers' own nomination on everyday learning behavior of the child

TI(s)= number of traits ×si

$$TI(s) = \frac{number\ of\ \ traits\ \times si}{number\ of\ triats\ \times 4}\ \times 100$$

- Peer nomination GBNS-S

$$PI(M) = \frac{(number\ of\ nominations)}{Total\ number\ of\ students} \times 100;$$

$$PI(S) = \frac{(number\ of\ nomination)}{Total\ number\ of\ students} \times 100$$

$$NI = \frac{\{TI+TI(s)+PI\ (M)+PI(S)\}}{4\times100}$$

Self-expression Index(SEI) was based on the response of questionnaries on the theme, "I and Mathematics" and "I and Science" where students were asked to thoughtfuly spend some time with Mathematics and Science and crtically intepret their relation with subjects. Each one was an open ended questionniare where students were supposed to give descriptive responses. Responses were divided into four discrete categories and each category was awarded distinct score. Qualitative responses were sorted out in the following four categories (Table 1.2):

Table 1.2: Categories depicting the responses on Instruments, 'I and Mathemtics" and "I and Science'

Category	Nature of response	Score
I	disliking for the subject	00
II	Liking for the subject as it is scoring	01
III	Liking for the subject as it is useful for the future career	02
IV	Appreciation/love and deeper understanding for the subject	03

After collecting and qunatifying all the data, an Identification Matrix was prepared to set the critreia for talent pool of potentially gifted children. (Table 1.3)

Table 1.3 Identification Matrix

Category	AI	NI	SEI
I	≥90%	≥80%	04
II	≥80%	≥70%	≥ 03
III	≥70%	≥60%	≥ 03

It was decided to set identification criteria at three different levels so as to make it more inclusive and to accommodate diversity in the sample. Identification matrix helped in preparing the talent pool of potentailly gifted students.(Table 1.4)

Table 1.4: Selected Pool of Potentially Gifted Students

Type of schools	Total students	Selected students
Private schools	7157	903
State level govt schools	11609	2468
National level govt schools	11478	1783
National level govt schools for talented children	571	43
Total	30815	5197 (16.9%) approximately

Thus, the first phase, Referral phase was completed with an exhasutive data collection and analysis.

2.1.2 Preparation and Analysis of Selection Phase

The next phase, Selection Phase was more indepth and subject specific. It was planned to identify signficant indicators in subject doamin which could differentiate between a promising trait and a significant trait. It was more focused on higher order thinking skills, creative aptitude, perservance to take challenge and child's natural closeness with the subject.

Higher order thinking skills are mental processes that require more complex engagement with the problem. It includes critical, logical, reflective, metacognitive, and creative thinking. These skills are manifested when an individual is encountered with unfamiliar problems, uncertain situations, unfamiliar questions, or situations with dilemmas. Individuals use complex mental processes to adjust with the given situations of dilemmas and conflict within the context of available knowledge and experiences, resulting in explanation, decisions, solutions and performances.

The selection phase was one of the most critical phases of identification where significant emphasis was given to the manifestation of higher order thinking skills in subject-specific contexts. A thoughtfully planned Science and Mathematics Ability Test- Assessment (SMAT- Assessment) was prepared to make a wiser assessment of students' higher order thinking skills and level of creativity in subject specific domain. SMAT-Assessment was a thoughtfully designed test. It was quite different from conventional tests. It was not an achievement test; it was rather an exploratory journey to engage students in challenging discourse of mathematics problem solving and scientific investigations. The test items were based on unfamiliar contexts. Items were open-ended and exploratory in nature.

The test items were selected on one or more than one criteria given below:

- Age appropriate abstract concepts
- Core thinking skills
- Higher order thinking skills
- Creative intelligence
- Brain storming
- Out of box thinking
- Multi-dimensional problem solving
- Instinct and insight
- Reflective analysis

SMAT-Assessment was prepared after extensive research, brainstorming and frequent meetings with the subject experts. SMAT items were prepared by the team of researchers, teachers and university faculty in the field of science, mathematics and education. The items were reviewed and validated by experts before doing a field trial. Items were finalized after field trial on a small sample.

Each participant school was personally visited by the researcher and an orientation program was organized in each school for the students who were selected through talent pool to briefly introduce them about SMAT-Assessment. They were told about the objectives and nature of SMAT-Assessment items.

The test was conducted in each school on the same day. Evaluation of response sheets of SMAT-Assessment was done quite differently. SMAT-Assessment neither aimed for right/wrong answer nor aimed for highest scorer. It was aimed towards problem solving approach, novelty in solutions and creativity in ideas. A rubric based criteria was developed to analyze the SMAT-Assessment responses fig (1.4). Students could solve/ answer a given problem in multiple ways. The novelty of response, originality in responses, extension of knowledge base and comfort with metacognitive processes were looked into for developing unique strength profile of each student.

SMAT-Assessment Instructional Outline

Science and Mathematics Ability Test (SMAT)

Grade Specific Science and Mathematics Ability Test

Dear Students,

The test is not a competitive test. It aims to excite, enrich and stimulate potentially gifted students in Science and Mathematics by developing their problem solving skills and having them experience the thrill of success while revisiting important science and mathematical concepts. It aims to assess the individual excellence in science comprehension, reasoning and mathematics problem solving, creativity and enthusiasm and highlighting learning strengths of each learner.

The assessment consists of four parts, each, for logical reasoning, Creativity, Mathematics and Science. Assessment is not based on right or wrong answer. It will be descriptive in nature and will be based on rubric based criteria. Students can solve/ answer a given problem in multiple ways. The novelty of responses, originality in responses, extension of knowledge base and comfort with metacognitive processes will be looked into while assessing responses assessment.

You are advised to read the questions carefully and plan meaningful strategy and appropriate reasoning to solve/answer each problem. Do write complete steps of the solution. You can solve a question through more than one method. Do not hesitate to write both methods.

The novelty of solutions and scientific arguments were given more weightage.

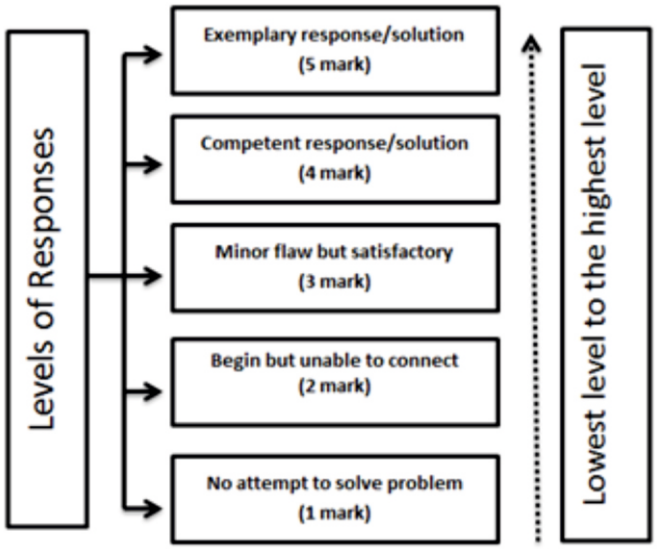

fig 1.4 Rubric Based SMAT-Assessment

SMAT–ASSESSMENT analysis was done by awarding qualitative indicators as well as quantitative scores. It focused more on cognitive processes involved in answering the questions. It provided a way to enter into the cognitive world of the child and to know the level of complexity involved in their responses. The entire assessment process allowed demystifying the complex cognitive world of children with unusual abilities. Group of significantly gifted children was developed on the basis of SMAT-Assessment responses.

Table 1.5: Cohort of Significantly Gifted Students in Science and Mathematics

Category	Number	% (from the referral stage)
I	81	1.6%
II	256	4.9%
III	301	5.8%

The criterion to prepare the group of significantly gifted students was developed by mapping the SMAT- responses of students to the corresponding level on the rubric scale. All students did not possess all kinds of higher order thinking skills and at same level of intensity but there was a mysterious coefficient which was deeper than simple intuition and more complex than simple mathematical logic/ scientific argument. It could not be simply defined as "the kind of ability "as it was unique for each unusual response.

Therefore, three different categories were prepared to make the identified group more inclusive and balanced. The total number of students selected for the significantly gifted students was almost 0.97% of the total sample population (30,815) and 5.7% of the students selected in the talent pool (5197).

2.1.3 Preparation and Analysis of Phase III (Scaffolding Stage)
Gifted children are so different in their thinking and perspectives that they find it difficult to adjust with the average peer group. Since their logic is far more advanced, their creativity is much beyond ordinary level of thinking and their intuition if fairly deep, they don't get easy acceptance from their chronological peer group. Though their cognitive age is much advanced than their chronological age but their other needs such as emotional and social needs do not match their cognitive age. Such an imbalance put them under tremendous pressure, as, at one level, they want cognitive challenges but they also want peer acceptance. So, many a times, such children hesitate to raise their curiosity or other advanced behaviors which others may find difficult to accept. In such a situation, such children push themselves to adjust with the norms rather than moving with the flow of their cognitive forces. Such a delicate situation requires more than an academic solution. It requires two-pronged strategy, one, to put these children in the company of like –minded group, meaning in, the company of children who also possess same level of intellectual force. Secondly, give them cover of emotional scaffolding in an academically challenging environment where they feel safe, accepted and heard. In such a setup, these children are provided little hand-holding and guidance by the suitably chosen mentors who not only provide them academic stimulation but also support them in their unusual way of thinking.

With this understanding, the third phase, Scaffolding Phase, was planned to put the selected cohort of significantly gifted children in mentorship program. Since, in India there was no such program was available, it was decided to start a mentoring program by networking with like-minded subject experts who believed in the very philosophy of giftedness and who were ready to become mentor for the selected children. In this regard, a unique program, 'University Outreach Mentoring Program' was started at Cluster Innovation Centre (CIC), University of Delhi where university professors were approached to join the program as mentors. It was further decided to initially start the program with smaller number of identified students. Therefore, the top 75 students identified at the second phase were invited for a rigors and stimulating academic engagement through University Outreach Mentoring Program.

The mentoring program was divided in two phases: weekend mentoring sessions and block-mentoring sessions. Initially, mentoring sessions were held on Saturdays where all students would come to CIC. After dividing them in smaller groups as per their classes, mentors used to pose new challenges to them and the students would work together in small groups to share and explore the possibilities. Mentors who were dedicated, sensitive and qualified subject experts used to closely observe students for their divergent thinking, originality, adaptability, fluency, inventiveness and creativity. The close interaction between mentor and mentees and an open forum of discussion and dialogue opened huge possibilities for students to move on the path of self-discovery. Slowly the bonding between mentors and mentees grew stronger and the discussions extended beyond Saturdays. Students started discussing the problems/ concepts/ experiments with mentors even during weekdays through emails or by visiting the center. Later, mentoring sessions became more rigors and converted into block sessions during long holiday periods. The exposure in the mentoring program allowed students to assess their true abilities and interests. They could take pride in their unusual way of thinking and working. They became independent learners and started believing in themselves. It also allowed mentors to work very closely with students. In this journey of scaffolding and guidance, mentors actually discovered enlightening movements of few of the students whom they found highly gifted. During their close interaction with students, mentors identified six such students who were highly gifted. Mentors recommended these six students for more challenging and highly advanced mentoring program which may give glimpse of real genius or exceptional young minds: the Pearl of Genius, fourth phase of identification process.

The process to identify suitable mentors for these six exceptionally gifted students is yet to be finalized. Otherwise, the current mentoring program is still continuing at the University where mentoring sessions are held on weekends and during long holidays. Though started as an experiment, mentoring program has successfully completed two years and the program is ready to be replicated in other parts of the country.

3. Conclusion

All kinds of diversity in India make it a challenge to start any national wide program on gifted education in the country. It is equally difficult to homogenously define giftedness in Indian context. At present, country is struggling to raise the standards of education for all. Education reforms are geared up to promote scientfic temper among students. Problem solving has become a compulsary part of evaluation at high school level, though it is yet become an integral part of teaching. Gifted children are getting mention in the vision statements of policy documents. Promoting talent in Mathematics and Science is one of the objectives of the report submitted by National Knowledge Commission. Defining giftedness and its identification has to be central around certain well defined and significnat parametres where examplar behaviours demonstarting the parametres can be context specific with varying degrees. Instead of creating exclusive infrastuture to educate gifted children, available resources can be utilized by setting up Gifted Resource Centre in universities and higher education institutes. Univeristies and other higher education institutes should be encouraged to intitate outreach programs for gifted children where university departments take responsibility to mentor gifted children. Interested and dedicated teachers from schools and from higher education institutes should be identitifed who are willing to work with gifted children. The present work can provide insight on how different segment of education system can work together for the betterment of learners. India cannot wait to create a mega program for gifted children. It is advisable to start small scale examplary programs at various levels and connect them together to map the diverse talent of the country. It is the only way for a meaningful, economical and sustaibale program to accept, acknowledge and promote presence of gifted children in the country.

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